



# MISSOURI DEPARTMENT OF NATURAL RESOURCES

## The Upper Mississippi River

Fact Sheet

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Division of Environmental Quality  
Water Pollution Control Program

### **What is the Upper Mississippi River?**

The stretch of the Mississippi from Minneapolis, Minnesota, to the mouth of the Missouri near St. Louis is often referred to as the Upper Mississippi River.

### **What's the river like between Minneapolis and St. Louis?**

The uppermost part of the Upper Mississippi River had a narrow flood plain bordered by steep bluffs. The river itself consisted of deep pools separated by shoals. Below Clinton, Iowa, the river entered a broad, alluvial flood plain averaging over 5.5 miles wide as it approached St. Louis. The quality of the water changed also, becoming progressively more muddy with more suspended sediment as it flowed out of the northern forests and into the prairie lands of Iowa, Missouri and Illinois.

### **How has the Upper Mississippi River changed over the past 300 years?**

In 1687, French explorer Robert Cavelier de LaSalle's travels down the river produced descriptions of not only the river's great size but also of the abundance of fishes, with catfish weighing over 100 pounds and sturgeon as large as canoes. The men that have traveled the river since LaSalle have changed it greatly. They have constructed 27 locks and dams across the river and made it a busy highway for river borne commerce. They have walled in the river channel with levees to protect themselves from floods, taken great numbers of fish and mussels from the river and introduced foreign aquatic species. At times, they have used the river as a sewer and garbage dump. And, they have reduced the size and changed the character of its great riparian forests.

### **What is the Upper Mississippi River like today?**

Today, the river is an important avenue of travel and commerce, a home for many aquatic species native to large rivers, an important habitat for migratory birds and resident wildlife and an important resource for recreation and drinking water supply.

### **What physical changes in the river were made to serve commercial navigation?**

Substantial physical changes in the river channel and in the flood plain began in the 19th century. During the 1830s, snags and other local obstructions such as shoals, sandbars and rocks were removed to ensure safer passage for steamboats. In the latter half of the 19th century, steamboat traffic increased sharply. Congress authorized the construction of a 4.5-foot-deep navigation channel in 1878 and a 6-foot channel in 1907. In 1913, a large dam was constructed on the river just below the rapids of Keokuk, Iowa, as a first step to making a reliable 9-foot-deep, 300-foot-wide channel from St. Louis to Minneapolis. An additional 26 locks and dams were constructed on the Upper Mississippi River during the 1930s, to complete a navigation channel heavily used today for large shipments of grain, fertilizer, fuels and construction materials.

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## **What about flooding?**

The construction of levees along the river banks to control flooding and the construction of ditches to allow drainage of wetlands and their conversion to farmland has changed the flood plains. Prior to human alteration, determining where river channels ended and flood plains began was neither easy nor particularly important. In the spring, the Mississippi normally overflowed and temporarily inundated low areas in the flood plain. Plant species in these areas were well adapted to flooding and provided fish with a food supply, spawning and nursery areas and shelter from predators during their spring aquatic phase. The river deposited nutrient-rich sediments used by the flood plain plants during the summer after the floodwater receded. These low-lying areas were heavily used during the spring and fall by migrating waterfowl and shorebirds. The entire flood plain corridor was a route for migratory song birds.

## **How did levees impact wetlands and the flood plain forests?**

The levees and channel control structures, such as dikes and retaining walls, restricted the meandering of the river channel and prevented the annual overflow of water onto the flood plain. As a result, a large percentage of flood plain wetlands were lost. Leveeing and land conversion reduced the size of the flood plain forests. The remaining forests suffered a great loss in diversity due to regulation of water levels for navigation. Consistently high flows during the growing season resulted in abnormally high soil moisture, which eliminated many tree species in favor of moisture-tolerant ones such as willow and silver maple.

## **How has the aquatic fauna changed in the last 100 years?**

Information is sparse for aquatic fauna of the Mississippi except for two groups, mussels and fishes. There are about 40 mussel species on the Upper Mississippi River. Mussels are important because of their value in the cultured pearl industry. In the past, mussel beds in the river were enormous. A single mussel bed two miles long and one-quarter mile wide produced about 500 tons of mussels annually in 1896. Commercial harvesting of mussels for freshwater pearls and for button making had greatly depleted the mussel beds by 1920. The industry was in serious decline by the 1930s, and the last button factory, located in Muscatine, Iowa, closed in 1967. Resurgence in mussel harvesting began in the 1960s when it was found that shell particles could be used as seed pearls in the cultured pearl industry. In addition to over harvesting, changes in the river channels caused by the navigation dams, water quality and flood plain development have resulted in the loss of five native mussel species and will probably result in the loss of more in the future.

## **Why is aquatic fauna important?**

The animals living in the river are important for several reasons. An ecosystem is healthier and generally more stable with a full complement of native species. It is usually self-sustaining and provides abundance of production, usually fish and shell fish, that can be harvested. A healthy and functioning ecosystem maintains the ability to assimilate wastes and is less susceptible to disruptions from extreme natural events, such as floods or pollution caused by humans. Ecosystems can adapt when changes in water chemistry or water body shape and flow occur gradually, although the diversity of species will likely also change in response to the changing conditions. In general, there is more open water habitat in the lower and middle reaches of the six pools bordering Missouri than was present in the late 1800s. Sedimentation in off-channel areas is greater due to erosion from farm land. Resuspension of fine sediments by wind or boat traffic degrades aquatic habitats.

## **What is the greatest threat to native mussels in the Upper Mississippi River?**

Perhaps the greatest threat to native mussels is the infestation of zebra mussels that entered the river in 1990 and were widely distributed in the Illinois and Mississippi rivers within four years. Zebra mussels, which originated in Asia, may out-compete native mussels for the available food

supply and, by their heavy incrustations on the larger native mussels, interfere with the native mussel's ability to feed. Again, an ecosystem is generally healthier and more stable with a full complement of native species, and the future commercial value of mussel harvesting along the Upper Mississippi River relies on the aquatic fauna.

### **What are the common fish species in the Upper Mississippi River?**

Ninety-five percent of the commercial catch is comprised of only four species: common carp, buffalo, catfish and freshwater drum. The introduction of the common carp, an Asian species, and the habitat changes brought about by the construction of the navigation dams has resulted in significant changes in the abundance of several important fish species in the river. Carp were not reported in the Mississippi until 1893. They now make up about 47 percent of the commercial catch. Buffalo, which represented 43 percent of the catch in 1894, now make up about 22 percent of the commercial catch. The decline of the buffalo species follows very closely the rise of carp populations in the river. Declines in other species such as skipjack herring, lake sturgeon, paddlefish and the American eel may have been due to the construction of the navigation dams that have blocked or impaired spawning movements.

### **What about trends in commercial fisheries on the Upper Mississippi River?**

Kenneth Carlander, a professor at Iowa State University, conducted the first large studies of the Mississippi River fishery in the 1950s. Commercial harvests on the Upper Mississippi River held constant or increased slightly from the 1950 through the 1970s. The harvests have ranged between 11 and 14 million pounds annually. From 1978 to 1991, the commercial catch has ranged between 8 and 11 million pounds.

“In general, the magnitude of the fisheries has not changed very much over the last 60 years. The total annual catch was apparently somewhat more from 1894 to 1922 than it has been since 1930. The difference in the relative abundance of various species...is probably more important than any decline in total catch.”

-- Carlander, 1954

### **What is the history of the water quality in the Upper Mississippi River?**

As settlement began along the Upper Mississippi River, sewage and garbage was routinely discharged to the river. The first serious, concerted efforts to adequately treat sewage discharges along the river began in the 1960s. By the late 1970s, almost all sewage discharges to the Upper Mississippi River were being adequately treated.

### **In the past, what have been the most serious chemical water quality concerns in the Upper Mississippi River?**

The most serious water quality problems have been caused by substances such as PCBs and mercury, which are not problems in the water but accumulate in sediments and living things. PCBs and mercury in the Upper Mississippi River are the results of wastewater discharges; mercury is also deposited from the atmosphere. Most of the chemical problems have been moderated over time; historical habitat problems related to damming and others, such as zebra mussel infestations, persist.

### **What are PCBs?**

PCB is the acronym for polychlorinated biphenyl, a man-made chemical with a number of industrial and commercial uses.

### **Should I be concerned about PCBs in the Upper Mississippi River?**

By 1970, fish from the Upper Mississippi River were showing PCB levels of up to 40 parts per million in the upper part of the river and as much as 1 to 2 parts per million in sections of the river bordering Illinois and Iowa. The recommended maximum level for human consumption is 2 parts per million. An aggressive national program to restrict PCB production and use and to promote recovery and destruction of existing PCBs has led to reductions in PCBs in fish tissue, particularly in the areas that were previously most contaminated. By the late 1970s, PCBs in fish tissue averaged less than 3 parts per million in the most contaminated areas of the Upper Mississippi River and less than 1 part per million in the portion of the river adjoining the state of Missouri.

### **Are there areas of the Upper Mississippi River that still have elevated levels of PCBs?**

The Lake Pepin area in the Upper Mississippi River still has elevated levels of PCBs in sediments. While average PCB levels generally fall below the recommended maximum level for human consumption of 2 parts per million, some fish with high fat content contain higher amounts of PCBs.

### **Should I be concerned about mercury in the Upper Mississippi River?**

Mercury concerns are similar to PCB concerns, but they have been less easy to manage. Industrial discharges of mercury are being more closely controlled now than in the past, but a significant portion of mercury comes from natural sources. Mercury in the Upper Mississippi River, because it concentrates up the food chain and over an individual's lifetime, is primarily a problem only in older top carnivores, such as walleye or northern pike. In the portion of the Upper Mississippi River adjoining the state of Missouri, mercury levels in fish are typically less than 0.2 parts per million. The maximum recommended level in food is 1 part per million.

### **Can I fish in the Upper Mississippi River?**

Yes. In the portion of the Mississippi River adjoining the state of Missouri, mercury levels in fish are typically less than 0.2 parts per million. The maximum recommended level in food is 1 part per million. The Missouri Department of Health has advised that no one consume sturgeon caught in the Mississippi River due to chlordane and PCBs found in them. The Department of Health also advises the public to limit consumption of carp, catfish, suckers and buffalo to one pound per week.

### **Can I swim in the Upper Mississippi River?**

Yes. The Mississippi River above the confluence with the Missouri River is recognized and protected as a recreational water by the state. All wastewater discharges to this part of river must be disinfected. Monitoring has shown that bacteria levels in this portion of the river meet state water quality standards for whole body contact recreation. Swimmers do need to be mindful of currents.

### **What are the present concerns about the Upper Mississippi River?**

There are high levels of suspended sediment, atrazine and nitrate-nitrogen entering the Upper Mississippi River from the rivers of central Iowa and Illinois. The popularity of the agricultural herbicide atrazine and its heavy use on corn and grain sorghum crops in the Midwest has resulted in detectable levels of atrazine in virtually all Midwestern rivers, including the Upper Mississippi.

### **What about nitrogen in the Upper Mississippi River - does it cause problems?**

Nitrogen in the Mississippi River, which comes mainly from fertilizers, is believed to be the main cause of a zone of dissolved oxygen and death of benthic organisms in a large area in the Gulf of Mexico. In this zone, some benthic organisms cannot survive. The shrimp industry has suffered as a result.

### **Does this affect my drinking water?**

Mean annual levels of atrazine in the Upper Mississippi River bordering the state of Missouri are less than 1 part per billion; the drinking water standard is 3 parts per billion. Even though extensive monitoring has shown that the atrazine levels on Midwestern rivers do not exceed drinking water standards, many drinking water suppliers provide extra treatment of drinking waters during spring and summer when atrazine levels are highest.

### **Can I drink the water from the Upper Mississippi River?**

No. The Missouri Department of Natural Resources recommends that you do not drink untreated water from any surface water. This is because all surface waters contain bacteria and many other waterborne disease organisms. Surface drinking water supplies are generally treated, including disinfection, with chlorine, before the water is distributed for people to safely drink. This treatment process protects humans against bacteria and other chemical contaminants that might enter a river, lake, reservoir, stream or creek.

### **Can I use the Upper Mississippi River as a source of drinking water for my livestock?**

Yes.

**The Missouri Department of Natural Resources has two goals for the Upper Mississippi River: One is bettering our understanding of this complicated physical and biological system. The second is managing it to maintain important economic uses, such as commercial navigation, while protecting a valuable drinking water supply, improving recreational opportunities and providing in stream and flood plain habitats for fish and wildlife.**